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ABSTRACT

There are several approaches to constructing relative value (RV) scales for physicians' services, including developing them from data on physicians' fees. This charge-based approach is straightforward, yet may yield RV scales which are distorted owing to the affects of health insurance on the underlying fee data.

This study estimates the effects of health insurance on absolute and relative measures of physicians' fees. An important finding is that relative fees are less affected by variation in health insurance coverage than are price levels for the medical procedures studied. That finding is evidence supporting the assertion that charge-based RV scales are free of insurance distortion.

Introduction

Recently, annual rates of increase in physicians' fees have exceeded the rate of general price inflation across the country. This has had grave consequences for Medicare's part-B physicians' expense insurance program.[1] These fee increases, coupled with increased utilization of services by Medicare beneficiaries, spawned substantial growth in Federal liabilities under that program. In an effort to control these spiralling expenditures, the Health Care Financing Administration is studying alternative reimbursement methods, including payment according to fee schedules.

A fee schedule is a set of fixed maximum payments for medical procedures. In contrast, payments under Medicare's present customary, prevailing, and reasonable (CPR) reimbursement system can take one of several value. For a given service, Medicare pays a reasonable fee set at the minimum of a physician's billed charge, his or her customary or median fee, or the prevailing charge among peer physicians in the area. Under that system, inflation in physicians' billings leads to inflation in Medicare reasonable fees after a short time lag, making it difficult for the government to control growth in part-B expenditures.

Many private insurers employ a similar charge based system for setting physicians' reimbursements, called the UCR approach. As competitive pressures force private carriers to find ways of controlling increases in premiums, they too will reexamine their reimbursement methods.

Setting payments according to a fixed fee schedule is one approach open to insurers intent upon controlling their liabilities. Among the alternative fee schedule construction methods is an approach based on relative values of physicians' services. These relative values, RVs, are cardinal measures of each procedure's "worth" relative to some baseline or numeraire service.

While not a fee schedule per se, the set of RVs is easily transformed into one. Insurers need only establish a price per RV unit; the fee schedule follows immediately as the product of that unit price and the number of RV units associated with each procedure.

A recent study developed and contrasted alternative, charge based, RV scales.[2] It showed them to be essentially invariant with respect to geographic and temporal differences in the underlying data, and with respect to the point on regional distributions of charges chosen to be the representative fee for each procedure.

Consistency in valuing medical procedures is insufficient justification for basing fee schedules on charge based RV scales. The scales' other properties need examination, including the extent to which they are distorted by different phenomena including variation in health insurance coverage. It is well known that health insurance breaks the link between market prices for medical services and their true worth to consumers. If price levels are affected by health insurance, then so might the corresponding relative values.

This study explores the relationship between health insurance and prices of physicians' services, both in level terms and relative to a numeraire. If it establishes relative prices to be essentially invariant with respect to shifts in insurance coverage, it strengthens the case for constructing fee schedules from charge based RV scales.

Model: The Market for Physicians' Services

Central to this investigation are a series of empirically estimated price level and relative fee equations. Equations in both classes are derivatives of a simple demand and supply model of the physicians' service market.

In this model, the supply of physicians' services (Q_s) is a function of market price (P) and exogenous variables (X_s) including cost of inputs to

production; supply is also determined by the availability of physicians (MD) in a region. This study treats MD as endogenous, permitting migration of physicians in response to regional fee differentials.

Demand for physicians' services (Q_d) is determined by prices and by exogenous factors (X_d) including population characteristics known to correlate with the underlying regional need for medical care. Demand also varies with individuals' ability to pay, health insurance coverage (I_d) being an important determinant of that ability.[3] Presuming that prices equilibrate supply and demand in each market, the complete model is:

(1) Q_s = supplies of physicians' services = $s(P, MD; X_s)$

(2) Q_d = demand for physicians' services = $d(P; I_d, X_d)$

(3) MD = availability of physicians = $a(P; X_a)$

(4) $Q_s = Q_d$ market equilibrium condition

Solving the model represented by these equations shows price to be a function of all exogenous demand and supply variables, including health insurance, and regional availability of physicians' services.

Health insurance may differentially affect procedures' prices since both coverage levels and the sensitivity of price to insurance may vary by procedure. These effects are embodied in the following general specification for a physicians' fee equation. Let the price (P_k) of the k^{th} procedure be a function of only two variables, insurance coverage (I_k) and a composite measure (X) of all other factors:[4]

$$(5) \quad P_k = I_k^{b_k} \cdot X^{c_k}$$

In this specification, the effect of insurance on price depends on the level of insurance coverage and the responsiveness or elasticity (b_k) of price to

that coverage.[5] Both factors may vary by procedures in a particular region.

The k^{th} procedure's price relative to a baseline or numeraire is expressable as:

$$(6) \quad P'_k = P_k/P_n = (I_k^{b_k}/I_n^{b_n}) \cdot (X^{c_k}/X^{c_n})$$

The relative price P'_k is independent of insurance distortions to the extent that the total insurance effects on both constituent procedures, $I_k^{b_k}$ and $I_n^{b_n}$, are equal.

Ideally, empirical health insurance variables ought to be specific to each procedure. However data limitations precluded the use of such measures in this study; instead it employed state-wide procedure-invariant health insurance variables (I). Substituting such a variable for the procedure-specific coverage measure yields a relative price equation:[6]

$$(7) \quad P'_k = P_k/P_n = (I^{e_k}/I^{e_n}) \cdot (X^{c_k}/X^{c_n}) = I^{(e_k-e_n)} \cdot X^{(c_k-c_n)}$$

In this modified specification, relative prices will be free of insurance distortion if the difference between elasticities of the procedure of interest and numeraire (e_k-e_n) is approximately zero. Conversely, given a positive level of gross health insurance coverage in a region, a significant insurance effect on the k^{th} procedure's relative price requires (e_k-e_n) to be non-zero.

The foregoing suggests a two step approach for assessing whether insurance distorts relative fees. In the first step, the study estimates parameters of price level equations; state average 1978 Medicare prevailing fees serving as dependent variables.[7] Inspection of insurance elasticities in these price level equations reveals the potential for insurance distortion of relative fees. As equations (7) shows, that distortion is embodied in the difference between insurance elasticities of price levels of selected

procedures and the numeraire. Under the null hypothesis, insurance elasticities of price are invariant across procedures; therefore, differences between them will be zero. In the second step, the study estimates the magnitude and statistical significance of these differences. Findings supportive of the null hypothesis that the $(e_k - e_n)$ are not statistically different from zero would be evidence that relative prices are not distorted much by health insurance.

The Health Insurance Industry: An Overview

As stated, the Medicare prevailing fees at the core of the price equations are for fee screen year 1978. These, in turn, were constructed by Medicare intermediaries from billings submitted by physicians during calendar year 1976. Consequently, an understanding of the way health insurance could effect these fees requires an understanding of the U.S. health insurance industry as it existed during the mid-1970s.

For the past two decades, physicians' expense insurance as well as coverage for hospital and surgical expenses in the U.S. has been provided by government sponsored Medicare and Medicaid programs and by private insurers. During that time, private carriers provided the greater share of physicians' expense coverage, nationwide. For example, in 1975, private health plans paid 38.8 percent of all expenditures on physicians' services, government paid 26.3 percent (13.4 percent paid by Medicare), with the remainder paid directly by individuals.[8]

During the 1970s, certain types of health insurance grew in popularity relatively faster than others. Among the former were physicians' expense coverage and major medical expense insurance. First introduced by commercial insurers in the early 1950s, major medical expense insurance provided comprehensive protection against the most serious and costly injuries and

illnesses. By the mid 1970s, this type of protection had remained essentially the province of commercial carriers who offered it both as a comprehensive policy and as a supplement to any insurers' basic medical expense coverage.[9]

Between 1970 and 1975, the U.S. population with physicians' expense coverage increased in numbers by 17.6 percent; the population with major medical insurance increased 30.4 percent over the same period. In contrast, growth in the populations covered by hospital and surgical expense insurance grew by 11.2 percent and 10.6 percent, respectively.[10] These data suggest that increases in aggregate outlays on health insurance premiums during the past decade are a direct result of expansion in physicians' expense and major medical expense insurance.

The methods insurers used to pay for physicians' services also changed during the 1970s. In particular, traditional indemnity payments based on fee schedules gave way to more generous, charge based, reimbursement. Blue Shield plans, especially, adopted the latter approach, often called usual-customary-reasonable reimbursement. Under UCR, the insurer pays the lesser of a physician's billings, that provider's usual charge, or the fee customarily charged by peer physicians in the region. When compared to fee schedule payment limits, maximum allowable reimbursements under a UCR plan are generally greater.[11] However, indemnity benefits tend to be "first dollar" coverage, while deductibles and other copayments are common elements of UCR reimbursement.

While the Blues frequently set payments for physicians' services via UCR methods, commercial carriers primarily relied on fee schedules for that purpose. However, the for-profit carriers generally employed UCR methods in

their major medical plans which supplemented much of the basic insurance underwritten by them.[12]

Empirical Analysis

This section develops and estimates parameters of price level and relative fee equations. The unit of analysis is the state; the period of study is the single year 1978. Descriptions of empirical price measures, demand, supply, and insurance variables follow immediately, with empirical results after them.

Prices

The dependent variables in the analyses are state average prevailing fees and fee ratios for fifty medical procedures that physicians frequently provide to Medicare beneficiaries. Among them are hospital and office visits, an array of surgical procedures, and commonly billed ancillary services. The state-average fees are population-weighted means of county level Medicare prevailing charges for 1978.[13] All monetary variables in the analyses, including average fees, are in real terms, having been deflated by a state cost of living index.[14]

Demand and Supply Variables

Among the explanatory demand variables in the price equations are the median years of post-high school education achieved by state residents (EDUC), and the fraction of the state's population age 65 or older (PCT65).[15] Aggregate data reveal health status to be positively correlated with schooling; the greater the educational attainment, the fewer days lost per year due to illness.[16] With demand for physicians' services implicitly lower among the more educated population groups, fees should be lower in states where average educational attainment (EDUC) is greatest. Conversely, the elderly are

expected to have greater need for medical services than members of other age groups. Given extensive participation of the elderly in the Medicare part B program, their greater need is translated via insurance into effective demand. Upward pressure on physicians' fees is the result, ceteris paribus.

Regression analyses not reported here included state-average household income as a explanatory variable. That variable was highly correlated with measures of health insurance; hence, both could not appear in the same price equation without greatly reducing the statistical significance of the estimated insurance effect.[17] Price equations are still well-specified in the absense of the houshold income variable, since income affects medical prices primarily through the purchase of health insurance. Including several measures of health insurance coverage in the price equation obviates the need for an explicit income variable.

Regional supplies of medical services at a given market price are determined by local availability of physicians and the cost of medical practice inputs. Unfortunately, reliable data on state average practice costs are not readily available. The omission of an input cost explanatory variable in the fee regressions is not serious if the former varies directly with the study's cost-of-living index. If so, deflating state average physicians' charges by that index removes much of the variation in charges attributable to inter-state differences in the costs of operating a medical practice.

Physician Availability

Medicare carriers compute prevailing fees from billings submitted by physicians in the medical specialty most likely to perform a given procedure. Consequently, the dependent variables in the regressions are average prices changed by physicians in a particular specialty. Those equations include physicians per population (DOCSPOP) among the explanatory

variables; by construction, DOCSPOP also corresponds to the specialty most likely to perform each procedure.[18]

In the market model, physicians per capita is endogenous, being jointly determined with average prevailing fees. To permit unbiased estimation of fee equation parameters, the analysis employs, as an instrument, the value of DOCSPOP predicted from a regression of physicians per capita against exogenous demand and supply variables.[19]

Physicians per capita should be negatively associated with average prevailing fees in a state. Greater availability of physicians in a region translates into greater supplies of their services. All else equal, the market clearing price should be lower in states with greater supplies and conversely when supplies are taut.

Measures of Health Insurance

The previous discussion of the insurance industry identified two important characteristics; the extent of insurance protection held by the covered population, and the relative share of the private market controlled by commercial carriers. As reported, populations with physicians' expense or major medical coverage have increased much more rapidly over the past decade than populations with basic health care coverage--hospital and surgical expense insurance. That trend suggests regional variations in purchases of health insurance are reflective of differences in coverage beyond basic protection. The overview also highlighted important differences between the basic physicians' expense insurance offered by Blue Shield and commercial carriers. Especially important were differences in payment mechanisms. Consequently, a measure of the share of a health insurance market held by commerical carriers will permit empirical estimation of any relationship between those differences and fee levels.

Two health insurance variables appear in each regression equation.[20] The first is deflated premiums per individual covered by private health insurance in a state (PREMCOV). A priori, that variable should be positively related to state average fee levels. This follows from the premise that interstate variations in premiums are positively correlated with variations in coverage beyond basic hospital and surgical expense insurance. The greater the average premiums per person, the greater the coverage and demand for physicians' services. Assuming unchanged market supply schedules, greater demand results in higher market price levels.

The second variable is the proportion of health insurance premiums in the state paid to commerical carriers (PCTCINS). It is impossible to predict the relationship between that variable and average physicians' fees. Greater market control by commerical carriers could imply more extensive major medical coverage--with an inflationary effect upon fee levels. Alternatively, greater PCTCINS could imply more extensive underwriting of basic physicians' expense insurance by commerical carriers. If so, the relationship between PCTCINS and average fee levels will depend upon the relative generosity of commercial insurers' reimbursements in contrast to Blue Shield plans' payments.

Empirical Results: Price Level Equations

Using least squares regression techniques and the state level data base, the study estimated coefficients of fifty price level equations; one for each of the medical procedures under investigation. This section summarizes these results, paying particular attention to coefficients of PREMCOV and PCTCINS, the health insurance variables. (Complete sets of coefficients and standard errors for the fifty equations appear in Appendix 3).

Equation (8) is the empirical analog of the general price equation (5) specified in the modelling section. The coefficients b_{4k} and b_{5k} in the

empirical version correspond to the insurance elasticity (b_k) of the generic equation.

$$(8) \quad \ln(P_k) = b_{ok} + b_{1k}\ln(EDUC) + b_{2k}\ln(PCT65) + b_{3k}\ln(DOCSPOP) + b_{4k}\ln(PREMCOV) + b_{5k}\ln(PCTCINS)$$

Recall that data limitations precluded specification of procedure-specific health insurance variables. Consequently, different insurance effects on procedures' prices within a state are completely defined by differences in estimated insurance elasticities of price (the coefficients on insurance variables in the price equations). If the elasticity of price with respect to a particular insurance variable is nearly constant across the fifty procedures, the hypothesis of a uniform insurance effect is supported. In Table 1 are means of these elasticities computed over all procedures in each of four classes; surgery, medical visits, radiology, and ancillary services.

Table 1

Insurance Elasticities
Mean Values for Classes of Procedures
(Price Level Equations)

Name	Class Size	Mean Coefficients (Elasticities) of Insurance Variables: PREMCOV	PCTCINS
Surgery	22	.274	.276
Visits	08	.339	.231
Radiology	07	.313	.455
Ancillaries	13	.236	.254
All Procedures	50	.280	.288

In Table 1, the mean value of the estimated b_{4k} across all fifty procedures is .280, implying that a ten percent change in real premiums per capita would be associated with a 2.80 percent change in mean fees in states. On averge, PREMCOV had the greatest effects on fees for physicians' visits, and the least on charges for ancillary services. However, scrutiny of the estimates of b_{4k} in Appendix 3 reveals the relatively narrow bounds within which most of them fell. In thirty-two of the fifty price level equations, they were within the range .20 to .50 and, of those, sixteen were significant at the .10 level or better. The validity of these results is supported by other econometric studies of physicians' fees. They reported insurance elasticities of prices similar in magnitude to those estimated here.[21]

The foregoing implies that selecting a numeraire whose coefficient on PREMCOV is near the mean will generate a relative price series that is largely unaffected by that measure of insurance. Or, at least, the new series will not be affected by health insurance as much as the set of price levels.

The best performing explanatory variable in the fifty price level equations was PCTCINS, the share of the state health insurance market controlled by commercial carriers. Estimated elasticities of fees with respect to that variable were positive and significant, at the 0.10 level or better, in thirty-seven of fifty equations. In only three cases were coefficients on PCTCINS negative. The preponderance of positive and significant coefficients on PCTCINS suggests that commercially sponsored major medical coverage exerts significant upward pressure on average fee levels in states.

Table 1 contains means of estimated coefficients on PCTCINS across the fifty regressions. As was true for the other insurance variable, these values fell within a relatively narrow band; thirty-nine within the range 0.20 to

0.50. Of those, thirty-three were significantly different from zero at the 0.10 level or better. Again, if a numeraire procedure's coefficient on PCTCINS is near the mean for all procedures, the resulting series of relative prices will exhibit less sensitivity to health insurance than did the price levels.

Among the other explanatory variables in the price level regressions, coefficients on average post-high school educational attainment (EDUC) and on the percent of the population over age 65 in states (PCT65) were rarely statistically significant. In the case of PCT65, lack of significance could possibly be attributed to the lack of variation in that measure across states.[22]

Physicians per capita (DOCSPOP) was positively and significantly associated with state-average prevailing fees in many of the regressions. This was especially true for the thirty surgical procedures and medical visits, where the coefficient on DOCSPOP was positive and significant in fifteen equations. While a positive association between fees and physicians per capita is contrary to the hypothesis that DOCSPOP is a supply variable, it is not inconsistent with past research findings.[23]

Relative Fees and Insurance

Given log-linear price equations for the k^th^ procedure and numeraire (n), the relative price equation is:

$$(9) \quad \ln(P_k/P_n) = b_{okn} + b_{1kn}\ln(\mathrm{EDUC}) + b_{2kn}\ln(\mathrm{PCT65}) + b_{3kn}\ln(\mathrm{DOCSPOP}) + b_{4kn}\ln(\mathrm{PREMCOV}) + b_{5kn}\ln(\mathrm{PCTCINS})$$

Of primary interest are the coefficients on the two health insurance variables. Reasonable approximations of b_{4kn} and b_{5kn} are the arithmetic differences $(\hat{b}_{4k}-\hat{b}_{4n})$ and $(\hat{b}_{5k}-\hat{b}_{5n})$, which one could compute directly from

parameters of the price level regressions.[24] However, by directly estimating relative value regression equations, the study obtained estimates of b_{4kn} and b_{5kn} and their standard errors; the latter being necessary for computing statistical significances. In all relative value regressions, the numeraire procedure was a comprehensive, new patient, office visit.

Appendix 3 contains least squares estimates of parameters for relative fee equations; table 2 summarizes coefficients on the health insurance variables. As expected, they are closer to zero in value than were their counterparts in price level regressions. Over all fifty relative price equations, the mean estimate of the coefficient on PREMCOV was .032, while the mean estimate of the coefficient on PCTCINS was -.060. Contrast these with the greater overall mean values for the price level equations reported in Table 1.

Table 2

Insurance Elasticities
Mean Values for Classes of Procedures
(Relative Fee Equations)

Name	Class Size	Mean Coefficients (Elasticities) of Insurance Variables PREMCOV	PCTCINS
Surgery	22	-.003	-.050
Visits	08	-.027	-.111
Radiology	07	.322	-.034
Ancillaries	13	-.027	-.063
All Procedures	50	.032	-.060

In the relative price regressions, the coefficients on PREMCOV were never statistically significant, while those on PCTCINS were significant at the 10 percent level or better in only four equations. Elasticities of relative fees were respect to PCTCINS ranged between -0.100 and +0.100 in thirty three of fifty cases. The same range covered coefficients of PREMCOV in twenty three equations.

In sum, the estimated insurance effects on relative fees were generally within a narrow range of values around zero. Furthermore, the coefficients on PREMCOV and PCTCINS were small in relationship to their standard errors, rendering them essentially indistinguishable from zero, statistically.

Summary and Conclusions

This study's goal was to determine the effects of health insurance on prices of physicians' services and, consequently, the usefulness of relative charges as the foundation of a fee schedule. It showed how total insurance effects on physicians' charges were dependent on coverage levels and on the responsiveness of fees to shifts in that coverage. Also, the study defined the conditions under which relative prices would be less sensitive than price levels to insurance distortion.

In the empirical analyses of prices of fifty Medicare procedures, insurance elasticities of fee levels were positive and significant in many instances, and consistently fell within a narrow range of values. By implication, a numeraire procedure whose price-responsiveness to health insurance was close to the mean across all procedures would generate a series of relative fees less sensitive than price levels to insurance distortion. Subsequent regression analyses of relative fee equations confirmed that assertion.

In conclusion, the theoretical and empirical results of this study support the contention that relative prices are appropriate as the foundation for the construction of physicians' fee schedules. Before one adapts relative charges to that purpose, additional empirical analyses ought to be performed to confirm this study's findings. This is especially important since the study estimated total health insurance effects from rather gross measures of state-wide insurance coverage undifferentiated with respect to medical procedures.

That caveat notwithstanding, the results support the assertion that a charge based relative value schedule need not suffer from insurance induced distortions. That, coupled with the ease of constructing relative values from relative fees, are important reasons for considering that approach.

FOOTNOTES

[1] Between 1975 and 1980, the physicians' services component of the CPI increased 59.0 percent while the overall CPI grew by 52.1 percent. (Statistical Abstract of the United States, 1982-83, p. 462). Over the same five years, Federal outlays under Medicare part B for physicians' services increased by 131.3 percent (Health Care Financing Review, Summer 1983, p. 117).

[2] Hadley, J. and Juba D., 1984.

[3] If there is a simultaneous relationship between health insurance and health care prices, it is most likely between insurance and hospital costs. In the recent past (Waldo, 1980) national expenditures on hospital services accounted for 40 percent of national health expenditures, while physicians' expenses were approximately 19 percent. Given the dominance of the hospital share of expenditures, it is likely that hospital costs, more than physicians' fees, drive purchases of health insurance. Evidence presented by Feldstein (1973) provides statistical verification of the link between demand for health insurance and hospital prices.

[4] In the empirical analyses of this study, demand and supply variables are measured at the state level and are invariant with respect to medical procedure. For that reason, the composite variable is not subscripted.

[5] The elasticity (b_k) of the k^{th} procedure's price with respect to health insurance is the percent change in price associated with a percent change in insurance coverage. Formally, elasticity (b_k) is defined as: $(\partial P_k / \partial I) \cdot (I/P_k)$.

[6] The elasticity of price with respect to procedure-invariant health insurance (e_k) is actually a composite of two other parameters; the responsiveness of price to procedure-specific health insurance (the b_k of equation (6)) and the elasticity of procedure-specific coverage to a change in procedure-invariant insurance. Further details are provided in Appendix 1.

[7] Medicare reimburses physicians the lesser of the billed charge or the customary, prevailing, or reasonable fee for each service. Physician-specific customary fees are the median fees charged by the physician for the procedure during the calendar year (1976) immediately preceding the fee screen year (July 1977 to June 1978). Prevailing fees are the 75th percentile of the distribution of customary fees for the procedure across all physicians in a defined region. The criteria of reasonability is employed to justify payment of a greater fee under extraordinary circumstances.

[8] Gibson (1980), p. 30, Table 6.

[9] Data in Table 1.5 of the Source Book of Health Insurance, 1981-1982 (Health Insurance Association of America) imply that approximately 70 percent of persons in the U.S. with major medical insurance in 1976 had such coverage through commercial carriers.

FOOTNOTES (Continued)

[10] Derived from data in Health Insurance Institute, Source Book of Health Insurance, 1981-1982, pp. 7-17.

[11] See Dyckman (1978) pp. 23-33 for a complete discussion of UCR reimbursement during the 1970s. He reported (p. 22) that 14 of 33 million contracts, 41.7 percent, written by Blue Shield plans in force in 1976 had UCR provisions. He surveyed nine major commercial and nonprofit carriers and reported, among other findings, that fees under a payment schedule were almost always below those paid under UCR.

[12] Dyckman (1978) reported anecdotal evidence from one large commercial carrier to the effect that over 95 percent of its basic insurance plans utilizing fee schedules also included major medical coverage supplementing the basic plan.

[13] Area Resource File as of July 1982; Department of Health and Human Services, Division of Health Professions Analysis. File data on 1978 prevailing fees are the 75th percentile charge for each of fifty procedures for General Practicioners and for Specialists. Most Prevailing Charges localities follow county boundaries and encompass one or more counties.

[14] Details of the construction of the cost-of-living deflator are available from the author. In brief, an index of family budgets for metropolitan areas was regressed against a set of predictor variables. From the estimated equation, the author created a series of predicted county-level cost-of-living indexes, then averaged them within states to obtain the state deflator.

[15] Data for both variables are from the State and Metropolitan Area Data Book, 1979; U. S. Department of the Census, Bureau of Labor Statistics.

[16] Educational attainment varies inversely with such morbidity statistics as days of restricted activity, bed disability, and work loss. See Table 6.3 in Health Insurance Institute, Source Book of Health Insurance Data, 1978-1979.

[17] The first order correlation between deflated income per household and premiums per covered population in states was .56. In OLS regressions of real premiums per capita against real household income and other explanatory variables, the income elasticity of insurance was .67 and was statistically significant at the .01 percent level.

[18] Depending upon the procedure, physicians per capita are non-federal, patient care, Cardiologists, Internists, Gynecologists, Neurologists, Radiologists, General Surgeons, or Urologists. Physicians in counties in 1975 were aggregated, yielding state totals. Source: Area Resource File as of July 1982; Department of Health and Human Services, Division of Health Professions Analysis.

FOOTNOTES (Continued)

[19] In the first stage regression, specialists per capita in states were regressed against the following dependent variables: short term hospital beds per capita, median household income in the state, median years of education of state residents, percent female population, and percent elderly population in the state, and percent of the population living in metro areas. Two insurance variables were also included, real premiums per insured resident, and a measure of commercial insurers' market share.

[20] See Appendix 2 for details on the construction of these variables as well as descriptions and sources of the underlying charge and population data.

[21] Feldstein (1970) examined the relationship between an index of physicians' prices and an aggregate health insurance variable using national data spanning the period 1948 to 1966. Among his reported findings was a long-run insurance elasticity of price in the neighborhood of 0.36, and a short-run elasticity of 0.20. Steinwald and Sloan (1974) reported significant elasticities of individual physicians' usual charges with respect to the extent of major medical insurance coverage in states. These elasticities were in the range 0.19 to 0.30. In a later study Sloan (1976) reported less significant and smaller elasticities of state-average fees with respect to major medical coverage; however, the elasticity for office visits was 0.17 and statistically significant. More significant insurance effects were reported by Sloan in that study vis a vis average practice revenues; elasticities with respect to major medical coverage were between 0.48 and 0.52 in value.

[22] Mean values for EDUC and PCT65 were 0.46 and 10.97 across all states; standard deviations were .175 and 1.76, respectively.

[23] See, for example: Newhouse (1970) and Feldstein (1970); Sloan (1974) reported mixed results in terms of signs on physicians per capita variables in specialists fee equations in contrast to those for general practicioners—the latter were more in keeping with traditional economic theory than the former, Dyckman (1978) reported that measures of surgeons per capita were positively and significantly associated with fees in metropolitan areas.

[24] In the analysis, most state-specific explanatory variables (X) are invariant with respect to the price level of the k procedures under study. Therefore, price level equations $P_k = X^{b_k}$ and $P_n = X^{b_n}$ imply relative price equations: $P_k/P_n = X^{b_k}/X^{b_n} = X^{(b_k - b_n)} = X^{b_{kn}}$. If one had been able to estimate all equations over data for all states, the computed difference $(\hat{b}_{4k} - \hat{b}_{4n})$ and $(\hat{b}_{5k} - \hat{b}_{5n})$ would have been identical to least squares estimates of parameters in the relative value equations. However, fee data on all procedures were not available for all states; also, a different physicians' per capita variable was used in each regression corresponding to the physician specialty most likely to perform the procedure. Therefore, estimates of parameters of equations (9) differ somewhat from computed differences between parameters of equations (8) for price levels.

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APPENDIX 1

The Effects of Alternative Measures of Health Insurance on Prices of Physicians' Services

In principal, prices of physicians' services are a function of both the level of insurance coverage in a region and the responsiveness (elasticity) of prices to shifts in that coverage. Unfortunately, readily available, state level data on health insurance are gross measures (primarily aggregate expenditures and estimates of total covered population) and undifferentiated across medical procedures. This appendix investigates how the effects of gross health insurance on physicians' fees are related to the effects of procedure-specific coverage on fees.

For analytic convenience, assume the relationship between procedure-specific insurance (I_k) and a gross measure of health insurance (I) can be approximated by the expression: $I_k = I^{a_k}$. The price of the kth procedure is now:

$$\text{i)} \quad P_k = I_k^{b_k} \cdot X^{c_k} = (I^{a_k})^{b_k} \cdot X^{c_k} = I^{e_k} \cdot X^{c_k}$$

The elasticity (e_k) of price with respect to procedure-undifferentiated insurance is revealed to be a composite of two parameters; the elasticity (b_k) of price with respect to procedure-specific coverage, and the elasticity (a_k) of procedure-specific insurance with respect to the gross measure of coverage.

Postulating true coverage of the numeraire to be a multiplicative function of the gross, procedure-undifferentiated insurance variable, the relative price (P'_k) of the kth procedure becomes:

$$\begin{aligned} \text{ii)} \quad P'_k &= ((I^{a_k})^{b_k} \cdot X^{c_k})/((I^{a_n})^{b_n} \cdot X^{c_n}) \\ &= (I^{e_k} \cdot X^{c_k})/(I^{e_n} \cdot X^{c_n}) = I^{e_k - e_n} \cdot X^{c_k - c_n} \end{aligned}$$

This specification appears as equation (7) in the text.

An important consequence of the foregoing is that empirical estimates of the insurance effect on relative fees based upon the gross health insurance measure will be approximately equal to the analogous effect of "true" coverage if the elasticity (a_k) is approximately 1.0 across all procedures. In other words, if increases in gross health insurance in a state acts as a rising tide uniformly lifting procedure-specific coverage, then the use of (I) rather than (I_k) in empirical analyses is innocuous. For in that case:

$$\text{iii)}\quad (I^{e_k}/I^{e_n}) = (I^{a_k b_k}/I^{a_n b_n}) = (I_k^{b_k}/I_n^{b_n})$$
$$= (I^{1b_k}/I^{1b_n}) = (I_k^{b_k}/I_n^{b_n})$$

As shown, when a_k takes the value 1.0 uniformly, the effects of health insurance on prices are the same for coverage measured as (I_k) or as (I).

Finally, it straightforward to demonstrate that the composite nature of e_k is not an artifact of the multiplicative form of the price and insurance equations. It is, instead, a general result. To establish this, define the elasticity of the kth procedure's price (P_k) with respect to "true" insurance coverage (I_k) as:

$$\text{iv)}\quad b_k = (\partial P_k/P_k)/(\partial I_k/I_k) = (\partial P_k/\partial I_k)\cdot(I_k/P_k)$$

Now, assume the true, procedure specific, insurance coverage is a general function of gross health insurance in a state:

$$\text{v)}\quad I_k = h(I)$$

Having established these relationships, the elasticity of the kth procedure's price with respect to gross insurance is:

$$\text{vi)}\quad e_k = (\partial P_k/\partial I)\cdot(I/P_k)$$

which, upon application of the chain rule becomes:

$$\text{vii)}\quad \begin{aligned} e_k &= \partial P_k / \partial I_k \cdot \partial I_k / \partial I \cdot I/P_k \cdot I_k/I_k \\ &= (\partial P_k / \partial I_k \cdot I_k/P_k) \cdot (\partial I_k / \partial I \cdot I/I_k) \\ &= b_k \cdot a_k \end{aligned}$$

In other words, the elasticity (e_k) of price with respect to gross state-wide health insurance is, in general, a composite of two other elasticities (b_k) and (a_k) which was to be shown.

APPENDIX 2

Construction of Health Insurance Variables

In this report are two measures of health insurance. The first, PREMCOV, is the ratio of (deflated) private health insurance premiums to the state population with private health insurance coverage in 1976. The second, PCTCINS, is the percentage of total private health insurance premiums paid to commercial carriers in the state. These variables, in turn, are constructed from data on insurance coverage and populations from several sources according to the following formulae:

$$\text{PREMCOV} = \text{INSUR}/((\text{SIEPC65} * \text{NONOLD}) + (.539 * \text{OLDPOP}))$$

$$\text{PCTCINS} = (.796 * \text{COMINS})/\text{INSUR}$$

Definitions of the primary variables follow:

BCINS	Health insurance premiums paid in 1976 to Blue Cross-Blue Shield and other medical society plans in the state (Source: Health Insurance Institute, *Source Book of Health Insurance Data 1977-1978*).
COMINS	Health insurance premiums paid in 1976 to commercial insurers in the state (Source: 1977-1978 Source Book).
.796	Income loss insurance adjustment factor; equivalent to the ratio of premiums paid to commerical insurers, nationwide, for hospital and medical coverage to premiums paid to commerical carriers for hospital, medical, and income loss protection. (Source: 1976 data premiums in *Source Book of Health Insurance Data 1978-1979*.)
INSUR	Total health insurance premiums paid in the state during 1976 to private insurers, net of income loss protection. $\text{INSUR} = \text{BCINS} + (.796\ \text{COMINS})$
SIEPC65	Estimated proportion of the state population under age 65 with health insurance coverage; estimate is net of duplicate coverage. (Source: 1976 Survey of Income and Education; U.S. Department of Commerce, Bureau of Census--as reported in Luft and Maerki 1982.)
OLDPOP	State population age 65 and over in 1978.

NONOLD	State population less than 65 years of age in 1978. (Source: *State and Metropolitan Area Data Book 1979*; U.S. Department of Commerce, Bureau of the Census.)
.593	Estimated fraction of the U.S. population age 65 and older with private health insurance coverage (Source: insured population, *1977-1978 Source Book*; total population, Statistical Abstract of the United States 1982-83).

Appendix 3

Table 3.1

Summary of Regression Results[a]

	Price Level Equations						
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
Surgical							
Skin Biopsy	.339 .0035	-2.467** (1.416)	.573* (.280)	-.126* (.051)	.000 (.169)	.480* .204)	.424* (.129)
Radical Mastectomy	.463 .0001	1.552** (.932)	.427* (.186)	-.058** (.034)	-.076 (.109)	.482* (.132)	.364* (.084)
Reduction of Fracture	.244 .0331	2.372 (1.526)	.556 (.337)	-.102 (.095)	.209 (.183)	.230 (.206)	.397* (.115)
Arthrotomy	.338 .0036	2.336** (1.406)	.421 (.311)	-.025 (.088)	-.233 (.170)	.231 (.193)	-.177** (.107)
Puncture Bursa	.228 .0632	-.558 (1.899)	.467 (.381)	.080 (.074)	-.237 (.222)	.381 (.268)	.231 (.171)
Bronchoscopy	.198 .0886	1.492 (1.291)	.373 (.256)	-.000 (.047)	-.062 (.154)	.283 (.186)	.312* (.117)
Thoracentesis	.375 .0011	-3.152 (1.963)	1.166* (.390)	-.175* (.072)	-.278 (.234)	.499** (.283)	.452* (.179)
Heart Catheter	.114 .4268	1.633 (2.510)	.055 (.145)	-.011 (.087)	.065 (.287)	.459 (.357)	.334** (.167)
Insert Pacemaker	.461 .0003	2.026 (1.513)	.123 (.098)	.022 (.051)	.013 (.170)	.438** (.221)	.554* (.104)
Blood Transfusion	.126 .3503	.077 (2.631)	1.144* (.515)	.011 (.097)	-.116 (.307)	-.188 (.378)	.324 (.238)
Colectomy	.266 .0221	3.341* (1.026)	.339* (.204)	.016 (.038)	-.006 (.124)	.221 (.151)	.327* (.095)
Appendectomy	.287 .0177	2.537* (1.201)	.162 (.243)	-.004 (.041)	-.061 (.136)	.322** (.163)	.344* (.110)
Sigmoidoscopy	.269 .0183	.132 (1.235)	.632* (.245)	-.083** (.045)	-.112 (.147)	.196 (.178)	.218** (.112)
Hemorrhoidectomy	.270 .0230	1.192 (1.273)	.246 (.240)	-.071 (.045)	-.008 (.144)	.463* (.181)	.344* (.113)

Table 3.1 (Continued)

Summary of Regression Results[a]

	Price Level Equations						
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
Cholecystectomy	.380 .0009	2.794* (.879)	.170 (.175)	.022 (.032)	-.047 (.105)	.366* (.127)	.320* (.080)
Repair Hernia	.535 .0001	1.802* (.733)	.355* (.146)	.007 (.027)	-.067 (.087)	.311* (.106)	.417* (.067)
Cystoscopy	.367 .0016	4.858* (1.313)	.950** (.479)	.025 (.062)	-.309 (.200)	-.070 (.202)	-.172** (.096)
Dilate Urethra	.234 .0453	2.276 (1.859)	.663 (.678)	.129 (.088)	-.230 (.283)	.068 (.286)	.065 (.136)
Prostatectomy	.319 .0051	4.296* (.867)	.410 (.316)	-.001 (.041)	-.131 (.132)	.238** (.134)	.231* (.063)
Prostate	.430 .0002	3.993* (.871)	.606** (.318)	.005 (.041)	-.188 (.133)	.237** (.134)	.289* (.063)
Hysterectomy	.409 .0004	4.379* (.820)	.256* .082)	.011 (.030)	.051 (.100)	.110 (.136)	.225* (.060)
Extraction of Lens	.478 .0001	3.560* (.868)	.403** (.230)	-.031 (.055)	-.060 (.099)	.273** (.148)	.245* (.068)
Medical							
Initial Office Visit Lim., New Patient	.301 .0127	-2.885 (2.111)	.384* (.184)	-.052 (.084)	.213 (.265)	.522 (.336)	.379* (.183)
Initial Office Visit[b] Comp., New Patient	.412 .0003	1.748 (1.305)	.114 (.113)	.059 (.051)	-.513* (.163)	.315 (.204)	.343* (.113)
Minimal Office Visit Estab. Patient	.111 .5260	2.917 (2.462)	.107 (.223)	.047 (.099)	-.305 (.305)	.005 (.409)	-.141 (.218)
Routine Office Visit Brief Follow-Up, Estab. Patient	.454 .0002	-1.041 (1.037)	.250* (.088)	-.060 (.041)	-.170 (.134)	.387* (.164)	.277* (.088)

Table 3.1 (Continued)

Summary of Regression Results^{a}

	Price Level Equations						
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
Routine Home Visit	.364	-.184	.154**	-.007	-.106	.334*	.281*
Brief Follow-Up	.0015	(.912)	(.079)	(.036)	(.114)	(.142)	(.079)
Initial Hospital Visit	.095	.196	.031	-.030	.095	.457	.147
Brief	.5711	(1.935)	(.173)	(.080)	(.243)	(.309)	(.163)
Initial Hospital Visit	.318	2.140	-.053	.122*	-.281	.344	.221**
Comprehensive	.0062	(1.354)	(.119)	(.054)	(.173)	(.212)	(.118)
Routine Hospital Visit	.399	-.732	.259*	-.016	-.271**	.347**	.340*
Brief Follow-Up	.0006	(1.190)	(.103)	(.048)	(.152)	(.186)	(.102)
Chest X-Ray	.212	-2.815	1.546	-.287	-.055	.090	.597*
	.0791	(1.879)	(1.220)	(.223)	(.293)	(.559)	(.258)
Spine X-Ray	.209	-1.379	1.727	-.204	-.030	-.194	.683*
	.0769	(2.009)	(1.197)	(.223)	(.305)	(.543)	(.269)
Hip X-Ray	.237	.821	1.066	-.024	.014	-.199	.391**
	.0530	(1.731)	(1.069)	(.195)	(.256)	(.498)	(.227)
Stomach X-Ray	.307	-3.192	-.371	.161	.037	1.143**	.417
	.0112	(2.168)	(1.390)	(2.56)	(.338)	(.627)	(.298)
Colon X-Ray	.217	-1.388	.055	.036	-.063	.715	.373
	.0651	(1.939)	(1.155)	(.215)	(.295)	(.524)	(.259)
Cobalt	.081	.883	1.337	-.277	-.055	-.098	.495
	.6461	(2.413)	(1.583)	(.292)	(.388)	(.710)	(.341)
Radiotherapy	.145	.214	-1.172	.105	.120	.734	.232
	.3053	(2.925)	(1.712)	(.321)	(.458)	(.743)	(.411)
Lab and Other Tests							
Hemoglobin	.255	-2.124**	.085	-.012	.151	.251	.361*
	(.0288)	(1.180)	(.100)	(.046)	(.145)	(.184)	(.101)

Table 3.1 (Continued)

Summary of Regression Results[a]

	Price Level Equations						
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
White Cell Count	.145	-.487	.032	.041	.201	.036	.261*
	.2485	(1.462)	(.124)	(.057)	(.179)	(.227)	(.126)
Blood Count	.356	-.012	-.191*	.028	.124	.323*	.185*
	.0022	(.941)	(.080)	(.037)	(.115)	(.146)	(.081)
Cholesterol	.296	1.629	-.164	.034	-.063	.078	.146
	.0124	(1.134)	(.101)	(.045)	(.140)	(.177)	(.098)
Hematocrit	.165	-1.391	-.060	-.000	.163	.292	.221*
	.1763	(1.216)	(.103)	(.047)	(.149)	(.189)	(.104)
Prothrombin	.194	-.181	-.037	-.002	-.019	.214	.256*
	.1110	(1.258)	(.108)	(.050)	(.157)	(.197)	(.107)
Sedimentation Rate	.128	-.873	.011	-.049	.013	.284	.201**
	.3237	(1.223)	(.104)	(.047)	(.150)	(.190)	(.105)
Blood Sugar	.361	.545	-.195**	.033	-.098	.221	.246*
	.0023	(1.278)	(.113)	(.050)	(.158)	(.199)	(.111)
Bun Urea Nitrogen	.520	.435	.240*	.055	.073	.168	.294*
	.0001	(1.128)	(.100)	(.045)	(.140)	(.175)	(.097)
Pap Test	.234	-1.060	.0168	-.0087	.195	.230	.385*
	.0459	(1.475)	(.125)	(.057)	(.181)	(.230)	(.127)
Urinalysis	.214	-1.333	-.036	.010	.073	.304	.296*
	.0699	(1.257)	(.107)	(.049)	(.154)	(.196)	(.108)
EKG	.195	1.827**	.013	.066**	-.060	.193	.101
	.0939	(.909)	(.079)	(.036)	(.113)	(.142)	(.079)
EEG	.242	.551	-.162	.044	-.147	.471**	.345*
	.0384	(1.653)	(.193)	(.086)	(.197)	(.240)	(.141)

Notes: [a]All variables entered in log form.

[b]Numeraire procedure.

*Coefficients are significantly different from zero at the .05 level.

**Coefficients are significantly different from zero at the .10 level.

Table 3.2

Summary of Regression Results[a]

		Relative Price Equations					
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
Surgical							
Skin Biopsy	.310	-3.728*	.289	-.194*	.524*	.165	.050
	.0075	(1.817)	(.360)	(.066)	(.217)	(.262)	(.165)
Radical Mastectomy	.283	.544	.097	-.118*	.433*	.152	-.016
	.0150	(1.410)	(.281)	(.051)	(.165)	(.200)	(.127)
Reduction of Fracture	.234	1.249	.101	-.071	.659*	-.113	.085
	.0412	(1.751)	(.387)	(.110)	(.210)	(.236)	(.132)
Arthrotomy	.341	1.251	-.045	.009	.225	-.124	-.484*
	.0034	(1.679)	(.372)	(.105)	(.203)	(.230)	(.127)
Puncture Bursa	.163	-1.760	.186	.038	.285	.063	-.151
	.2050	(1.932)	(.388)	(.075)	(.226)	(.273)	(.174)
Bronchoscopy	.169	.312	.082	-.066	.447*	-.043	-.056
	.1539	(1.683)	(.334)	(.062)	(.200)	(.242)	(.153)
Thoracentesis	.297	-4.332**	.876**	-.241*	.231	.172	.085
	.0091	(2.301)	(.457)	(.084)	(.274)	(.331)	(.209)
Heart Catheter	.122	-1.319	-.090	-.068	.620*	.258	.060
	.3852	(2.738)	(.158)	(.095)	(.313)	(.390)	(.182)
Insert Pacemaker	.196	-1.253	-.047	-.040	.569*	.291	.295**
	.1467	(2.214)	(.143)	(.075)	(.249)	(.324)	(.152)
Blood Transfusion	.139	-1.583	.860	-.054	.385	-.444	-.015
	.2864	(2.989)	(.585)	(.110)	(.349)	(.430)	(.270)
Colectomy	.253	2.168	.050	-.049	.506*	-.111	-.038
	.0302	(1.366)	(.271)	(.050)	(.165)	(.201)	(1.26)
Appendectomy	.196	.945	-.148	-.076	.495*	.044	-.005
	.1163	(1.754)	(.354)	(.060)	(.199)	(.237)	(.161)
Sigmoidoscopy	.315	-1.048	.341	-.149*	.397**	-.131	-.150
	.0057	(1.675)	(.332)	(.061)	(.199)	(.241)	(.152)
Hemorrhoidectomy	.282	-.844	-.027	-.155*	.498*	.242	.035
	.0174	(1.713)	(.323)	(.060)	(.194)	(.244)	(.152)

Table 3.2 (Continued)

Summary of Regression Results[a]

	Relative Price Equations						
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
Cholecystectomy	.195	1.614	-.121	-.044	.461*	.040	-.048
	.0926	(1.384)	(.275)	(.051)	(.165)	(.199)	(.126)
Repair Hernia	.205	.622	.065	-.059	.442*	-.015	.049
	.0762	(1.357)	(.269)	(.050)	(.162)	(.195)	(.124)
Cystoscopy	.302	2.425	.292	.002	.346	-.303	-.453*
	.0092	(1.982)	(.723)	(.094)	(.302)	(.305)	(.145)
Dilate Urethra	.128	-.156	.005	.106	.425	-.165	-.216
	.3255	(2.407)	(.878)	(.114)	(.367)	(.370)	(.176)
Prostatectomy	.220	2.049	-.316	-.014	.546*	-.010	-.071
	.0554	(1.387)	(.506)	(.066)	(.212)	(.214)	(.101)
Prostate	.177	1.746	-.119	-.008	.488*	-.010	-.013
	.1337	(1.407)	(.513)	(.067)	(.215)	(.217)	(.102)
Hysterectomy	.235	2.221	.061	-.065	.465*	-.109	-.068
	.0403	(1.348)	(.135)	(.049)	(.165)	(.224)	(.099)
Extraction of Lens	.162	1.140	-.130	.001	.463*	.089	.028
	.1762	(1.516)	(.402)	(.095)	(.173)	(.259)	(.119)
Medical							
Initial Office Visit Lim., New Patient	.286	-4.269**	.309	-.115	.732*	.113	.038
	.0181	(2.396)	(.209)	(.096)	(.301)	(.381)	(.208)
Initial Office Visit[b] Comp., New Patient							
Minimal Office Visit Estab. Patient	.195	1.785	.063	-.029	.242	-.481	-.482*
	.1742	(2.559)	(.232)	(.103)	(.317)	(.425)	(.226)
Routine Office Visit Brief Follow-Up, Estab. Patient	.261	-3.023**	.118	-.106	.406**	.099	-.068
	.0357	(1.639)	(.139)	(.065)	(.219)	(.259)	(.140)

Table 3.2 (Continued)

Summary of Regression Results^{a}

		Relative Price Equations					
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
Routine Home Visit	.203	-1.932	.040	-.065	.407*	.019	-.062
Brief Follow-Up	.0794	(1.369)	(.118)	(.054)	(.171)	(.214)	(.118)
Initial Hospital Visit	.170	-.749	.013	-.081	.497**	-.018	-.179
Brief	.2081	(2.211)	(.197)	(.091)	(.278)	(.353)	(.186)
Initial Hospital Visit	.121	.385	-.179*	.068	.253	.033	-.129
Comprehensive	.3593	(1.220)	(.108)	(.049)	(.156)	(.191)	(.106)
Routine Hospital Visit	.134	-2.603	.135	-.067	.270	.051	-.005
Brief Follow-Up	.2943	(1.663)	(.144)	(.067)	(.212)	(.260)	(.142)
Chest X-Ray	.198	-5.046*	.058	-.116	.636**	.372	.087
	.1041	(2.212)	(1.437)	(.262)	(.345)	(.658)	(.340)
Spine X-Ray	.146	-3.224	1.000	-.158	.549	-.277	.277
	.2429	(2.337)	(1.391)	(.259)	(.355)	(.631)	(.312)
Hip X-Ray	.175	-2.155	-.485	.142	.714	.213	-.087
	.1698	(2.059)	(1.272)	(.232)	(.305)	(.593)	(.270)
Stomach X-Ray	.171	-4.055	-1.334	.248	.689	1.050	-.155
	.1812	(2.231)	(1.431)	(.263)	(.348)	(.646)	(.306)
Colon X-Ray	.118	-3.233**	-.672	.082	.516**	.632	-.033
	.3753	(1.942)	(1.157)	(.215)	(.295)	(.525)	(.260)
Cobalt	.178	-1.597	.246	-.169	.611	-.177	-.081
	.1717	(2.600)	(1.706)	(.315)	(.418)	(.765)	(.368)
Radiotherapy	.194	-.961	-1.585	.097	.768	.440	-.251
	.1411	(3.027)	(1.772)	(.333)	(.474)	(.769)	(.425)
Lab and Other Tests							
Hemoglobin	.280	-4.300*	-.021	-.064	.657*	-.006	.049
	.0161	(1.543)	(.131)	(.060)	(.189)	(.240)	(.133)

Table 3.2 (Continued)

Summary of Regression Results[a]

		Relative Price Equations					
	R-Squared	Regression Coefficients (Standard Errors)					
PROCEDURE	PROB > F	CONSTANT	DOCSPOP	EDUC	PCT65	PREMCOV	PCTCINS
White Cell Count	.249	-2.662	-.073	-.011	.707*	-.220	-.051
	.0326	(1.818)	(.155)	(.071)	(.223)	(.283)	(.156)
Blood Count	.327	-2.188	-.296*	-.024	.630*	-.066	-.127
	.0049	(1.514)	(.129)	(.059)	(.186)	(.235)	(.130)
Cholesterol	.327	-.511	-.280*	-.014	.434*	-.172	-.172
	.0058	(1.464)	(.130)	(.058)	(.181)	(.228)	(.127)
Hematocrit	.268	-3.567*	-.165	-.052	.669*	.035	-.091
	.0210	(1.668)	(.142)	(.065)	(.204)	(.260)	(.143)
Prothrombin	.227	-2.476**	-.130	-.061	.462*	-.019	-.054
	.0583	(1.459)	(.125)	(.058)	(.182)	(.228)	(.124)
Sedimentation Rate	.247	-3.049**	-.095	-.101	.519*	.028	-.111
	.0345	(1.608)	(.137)	(.062)	(.197)	(.250)	(.138)
Blood Sugar	.369	-1.595	-.312*	-.016	.400*	-.029	-.071
	.0019	(1.340)	(.119)	(.053)	(.166)	(.209)	(.116)
Bun Urea Nitrogen	.418	-2.118	-.329*	-.010	.539*	-.031	.006
	.0007	(1.425)	(.126)	(.057)	(.177)	(.222)	(.122)
Pap Test	.281	-3.236**	-.089	-.060	.701*	-.026	.073
	.0158	(1.729)	(.147)	(.067)	(.212)	(.269)	(.149)
Urinalysis	.247	-3.509*	-1.42	-.042	.579*	.048	-.016
	.0343	(1.524)	(.130)	(.059)	(.187)	(.237)	(.131)
EKG	.281	.080	-.101	.008	.454*	-.122	-.242*
	.0137	(1.235)	(.107)	(.049)	(.154)	(.193)	(.107)
EEG	.187	-1.066	-.309	.019	.356**	.092	-.008
	.1183	(1.682)	(.196)	(.088)	(.201)	(.244)	(.143)

Notes: [a]All variables entered in log form.

[b]Numeraire procedure.

*Coefficients are significantly different from zero at the .05 level.

**Coefficients are significantly different from zero at the .10 level.

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